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RECLAMATION

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Editor
Carol A. White

Inquiries should be addressed to: Editor, *Reclamation Era*, Water and Power Resources Service, Code 140, P.O. Box 25007, Denver Federal Center, Denver, CO 80225

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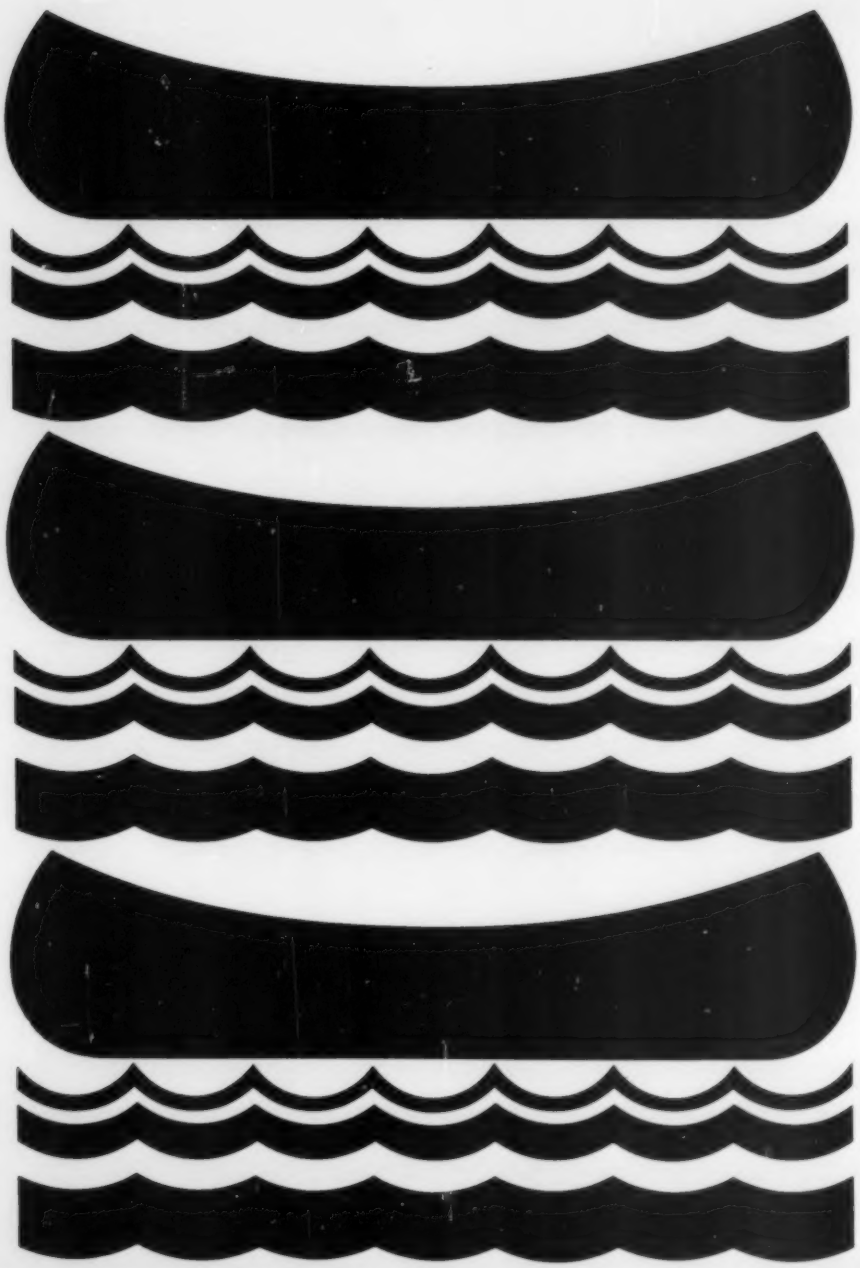
As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

The Columbia Basin Experience

by Carol Prochaska



Sandy gulped as Dan handed her a life jacket to wear on the canoe trip that would take them down the winding, multi-branched irrigation wasteway that cuts through miles of sand dunes in central Washington State. Sandy doesn't swim, and this was her first time ever in a canoe. More than a little anxiety lay behind that muffled gulp.

On the other hand, she was beginning to have a good feeling about several of the others in the group. Sandy was determined that this would be a fun, fun day. True, she wasn't about to buy all of Vim's crusader viewpoint on preservation and zero-level development of resources, but at least she knew "where Vim was coming from". And, it was a far cry from Sandy's Chamber of Commerce approach.

Dan, her canoeing companion, was supposed to be the guide on the 12-mile long trek. Some guide! Everyone else was launched by the time their canoe hit the water.

Carol Prochaska is the Public Information Officer, Columbia Basin Project, Ephrata, Wash.

Photography by Glade Walker, Pacific Northwest Region.

On the Winchester Wasteway.

A motley crew—can you pick out the banker, the fisherman, the bureaucrats?

As they pushed off, the other five canoes were rounding the first bend and disappearing from sight. In the lead Jim, the Columbia Basin Project Manager, and Bob, a well-known TV commentator from Seattle, stopped paddling as two or three ducks lifted into the sky.

A little further on, the early morning stillness was broken by the sharp slap of the paddle on the water as Tom, a local farmer, struck at a foot-and-a-half long carp lurking near the bow of his canoe.

The morning chill that had prompted most of the group to don jackets and hats soon gave way to hot summer sunshine. Before long, Dean had pulled off his shirt and Chan was down to shorts. An unfamiliar quiet pervaded the air. Except for the slurp, slurp of the paddles and an occasional yelp, as one or another of the canoes hit the rushes rounding a bend, there was little sound. One could imagine a world without tall buildings and noisy cars, a world never suspected when driving the many roads that serve this irrigated farming area.

For the first few miles the wasteway was rimmed with cattails and water reeds as it followed the contours of the sandy plain. Further on, the channel narrowed and mounds of sand rose for as much as 20 to 30 feet into the sky. Carol explained to Meral, who is a member of the League of Women Voters, that construction of the wasteway was kept to the minimum necessary to send the return flows from irrigated farms into the Potholes Reservoir. Once into the reservoir, Carol added, it is used again and again to water thousands of acres of farmlands in the southern part of the Columbia Basin Project. Since the water has been allowed to pick its own course, it twists and turns, wandering through the sand dunes to its destination in the huge lake now called the Potholes Reservoir.

As they paddled, Arnold, a dryland farmer, and Laura, a State of Washington solicitor, talked about the geology of the area. Arnold was explaining how at the end of the Ice Age, massive floodflows swept through the entire area cutting and gouging the deep coulees and scouring the earth. He explained that the Grand Coulee and Drumheller Scablands to the south are known and visited by geologists from all parts of the world.

The past was forgotten when Rod, who was now in the lead canoe, pulled up at a particularly wide, shallow reach and pointed ahead. There in the shallow water were two triangles...triangles of long, spindly legs meeting a body that bent forward to let a thin, needlelike beak probe the mud at its feet. The triangles, of course, were American Avocets who have taken up residence along the wasteway. A little further on a mother and three or four babies busily looked for food with never a second glance at the intruders.

Each bend brought new sights and sounds. Desert primrose in bloom, and a showy newcomer called loosestrife. In the distance a great blue heron stood silhouetted against the horizon.

The sun was at its highest when, with sore and tired muscles, the group pulled up to a sand dune. Soon they were opening lunch baskets filled with homemade sandwiches and fruit freshly picked from Carol's backyard.

Some made it through the rapids...

Some didn't.

For some, the next 2 hours passed as if time were pulling a ball and chain. Each dip of the paddle spread the fire that was building up in neck and shoulder muscles. After awhile, the landscape seemed to be repeating itself. It became harder and harder to keep the canoes from careening off into the bank where sometimes clumps of Russian olive trees waited to tear tender skin with their stiff, sharp thorns.

At this point, when at least half the group were asking, "How did I ever get myself into this?" Sandy heard a shout ahead. The shout was soon replaced by peals of laughter. Answering her look, Dan said, "The falls lie just ahead...hold onto your hat, we're going to show them how to make it over."

From around the bend came the sound of falling water. White ripples appeared as water rushed across submerged rocks. Now, the canoe moved forward on its own and Dan was urging Sandy to steer to the right where the main flow of water disappeared over a ledge.

So they rode the rapids, with no time to be frightened, and ended up laughing and gloating in an upright canoe. Others were not so fortunate. There was much scurrying and yelling as Jim and Chan, Nancy, Polly, and Neil overturned and clawed up out of the water sputtering and wet.

Below the falls, the stream became a small river, winding through clumps of reeds as tall as trees. At times it spread only a few inches deep across a quarter mile of open marsh. Sometimes the channel branched and tricked the unwary into side trips ending in closed lagoons. Along this stretch, two green-headed mallards lifted into the sky. It was a time for swatting deer flies and for conversation with little-known travelling companions.

Finally, Dan passed the word that the end was in sight. Thirty minutes later the canoes were beached and trailers loaded. The weary crew had straggled into camp.

That evening, refreshed by cold drinks and an outdoor dinner, a close-knit, sensitive group gathered to rehash the events of the past 2 days. They recalled the spectacular beauty of the irrigated canal when it drops over Summer Falls, the giant siphon and tunnel that someday will carry water to another half million acres of farmland, the towns that serve the agricultural community and, especially, the wonderful farm families they had stayed with the night before.

The discussions went on and on. Issues and concerns were tossed out and chewed up. What kinds of restrictions should be placed on farm size when the water is subsidized by tax dollars? Why shouldn't hunters have the right to go onto private land to shoot pheasants put there by the State? Does the Federal Government have the right to charge for water that already belongs to the people? What should be done with wetlands that develop on the project?

It didn't matter that many of these or the other questions asked did not get answered. Each person left knowing that somebody out there cares what goes on, and has ideas on how it should be done. Now, should the need arise, they know someone to contact. As Nancy wrote after returning home, "After all, how many times can you crash into the bulrushes, capsize over waterfalls, go sideways or backwards when that wasn't exactly what you intended, without developing a rapport, a memory of shared lunacy, that will always be with you?"

The Second Basin Siphon and Tunnel construction site...one of the early tour stops.

Sand mounds 20-30 feet high.

Lunch at Summer Falls on Banks Lake.

Author's Note

This story is a composite of the canoeing experience which was one of the features of three two-and-one-half day field seminars conducted during the summer of 1979 by the Pacific Northwest Region's Columbia Basin Project, which is located in central Washington State.

The seminars were aimed at providing a different kind of opportunity for people to learn about the Water and Power project, its impacts, problems, people, and concerns. By bringing together people from different backgrounds and interests, Water and Power hopes for an expanded awareness of the issues confronting decisionmakers.

This unusual approach to public involvement was tailored to provide a learning-sharing experience. The informal setting and relaxed atmosphere encouraged open communication and discussion of concerns and ideas on resource development and conservation among the members of the group. The interaction and contacts established are expected to set the stage for the development of more productive working relationships among the various interest groups.

Each seminar started on a Friday morning with a brief orientation on the Columbia Basin Project and its development. This was followed by a tour of the irrigated area. The tour route included irrigation system structures, community development, irrigated farmlands, fish and wildlife enhancement areas, future irrigation systems, low-head power sites, seepage problems, and other impacts of development.

That evening the participants were guests of project farm families. They learned about the problems and satisfactions which are a part of operating an irrigated farm, the family lifestyle, and were the recipients of some very warm hospitality. An account of the farm visit, written by one of the participants will appear in a future issue of *Reclamation Era*. The seminars ended Sunday morning with a wrap-up and critique.

Each group involved about a dozen people whose occupations or organizational affiliations included journalism, academia, irrigation districts, veterinary sciences, sportsmen's associations, League of Women Voters, legislators and legislative staff, law, agriculture, power administration, State and Federal agencies, Water and Power officials, and others.

How successful were the seminars in meeting Water and Power objectives? We really don't know. Once again Nancy throws a little light on what was happening with her group when the time came to leave for home. She wrote later, "During the final farewells at the parking lot, Neil and I hugged each other goodbye. Now if you'd told me 48 hours before that an environmentalist would be embracing a Water and Power man, I'd have told you to lay off the sauce (amazing what capsizing a canoe can do for a relationship)."

As for the future it is too soon to say. We do know that some group members are keeping in touch. Hopefully, this contact will continue and spread among the others.

China: Promising Vistas For The 80's

by Gina Salazar

"Firmly carry out the policy of readjusting, restructuring, consolidating, and improving the national economy and win the first battle for the four modernizations!" the slogan read in Chinese newspapers, September 15, 1979. It celebrated the 30th anniversary of the Peoples Republic of China.

The world's largest country, China, is underdeveloped in terms of Gross National Product (GNP). Yet, it is one of the six largest producers of goods and services in the world and has the world's third largest annual expenditure on defense.

Within the next three years, we will see the effects of China's efforts to achieve an equal relationship between the various branches of their economy through "the four modernizations."

Gina Salazar was a Student Writer-Editor from Colorado State University, working in the Public Affairs Service Center, Denver, Colo.

Chinese silks, bicycles, wristwatches, cameras, television sets, coal and oil may soon be traded on the international market in large quantities.

The Chinese national economic plan was presented by Yu Qiuli, Vice-Premier and Minister-in-Charge of the State Planning Commission, to the Second Session of the Fifth National Peoples Congress on June 21, 1979. It focuses on the developments deemed necessary to balance the nation's economy.

The motive underlying such an extensive readjustment of the economy is best explained by the Communique of the Third Plenary Session of the 11th Central Committee of the Chinese Communist Party:

"The restoration and development of our national economy since the downfall of the 'Gang of Four' has been very rapid...But it has to be noted that due to the sabotage by Lin Biao and the 'Gang of Four' over a long period there are still quite a few problems in the national economy, some major imbalances have not been completely changed and some disorder in production, construction, circulation and distribution has not been fully eliminated."

A Better Balance Needed

Four major imbalances are receiving the most attention. The first is the slow rate of agricultural production compared to industrial production.

China's second imbalance creates a situation in which light industry, such as textiles, does not produce sufficient funds to support development of heavy industry.

A third is within heavy industry. According to the *Beijing Review*, the development of coal, electric power, petroleum, transportation, and building materials has failed to keep pace with the development of the machine-building and processing industries.

The difference between accumulation and consumption is the fourth imbalance. Large-scale capital construction, such as factories, has exceeded the construction rate of housing projects, cultural and educational services, and public health facilities.

Agriculture Is The Key

To tackle these imbalances, China plans to expand its agriculture, light and heavy industries, and other branches of its industrial base in a harmonious fashion. China's goal is to maintain a rational proportion between accumulation and consumption.

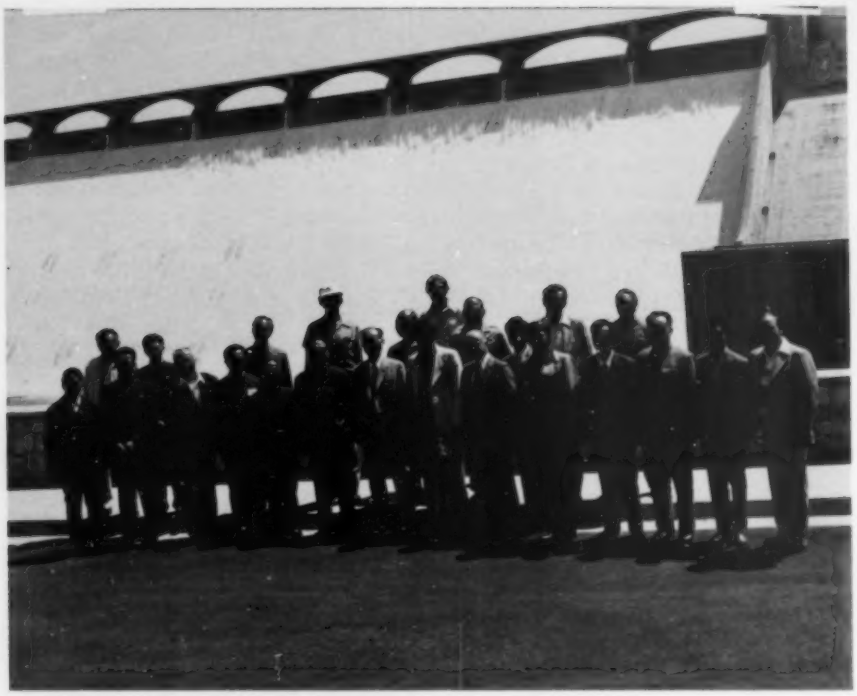
Special attention, however, will be directed toward agriculture since it is the foundation of China's economy. Large investments will be funneled into agriculture to accelerate its development.

Agricultural output in 1978 increased 8.9 percent over 1977, according to the 1978 economic report. There were overall increases in grain, cotton, tea, sugar, vegetables, tobacco, fruit, medicinal herbs, and other products.

Vice-Premier Yu said every effort should be made to speed up the growth of light industries and the production of textiles. Investment in light industry increased from 5.4 percent to 5.8 percent in 1979.

Light industries will be given priority in fuel supplies and allocation of raw materials. Special attention will be given to improving the quality of textiles and other light industrial goods by improving designs and variety. Chinese leaders believe this will generate new revenues from the international market, which will be reinvested to build China's economic future.

Chinese delegation at Rock Island Second Powerhouse No. 2 turbine.



Chinese delegation at Grand Coulee Dam, accompanied by officials from the Water and Power Resources Service, Bonneville Power Administration, private power companies, advisors and interpreters.

Investment in heavy industry decreased in 1979. The monies allocated to this industry were invested in the coal, petroleum, electric power, and building materials industries.

New and existing energy supplies will be tapped to provide China with electricity to operate its light industries, and to offer an exporting commodity on the international market.

With a staunch independent posture, China will import the necessary technology and funds to step up its economic development. Efforts to expand exports and foreign trade are recognized as an important contributor in the success of China's economic plans.

Beijing Looks To The West

The United States is one of the countries to which China has cautiously opened its doors. For nearly 30 years, relations between China and the U.S. have been tense and, at times, have involved open conflict.

Sino-American relations began to improve when President Richard M. Nixon toured The Peoples Republic of China in 1972. In August 1979, Vice President Walter Mondale sought improved U.S.-China relations during his trip to China.

During that trip, Mondale and Vice-Premier Deng Xiaoping signed a cultural pact that included U.S. assistance in China to develop 20 hydroelectric power projects on a technical-advisor basis. The document also included a protocol agreement for cooperation in water resource management.

The construction of new water facilities will play a major role in China's national economic plan. Special attention has been given to the construction of Dahua Hydropower Station and other electric power projects. These facilities will help solve the problem of power supply for industrial and agricultural production.

Two key projects are discussed in the 1979 economic plan, according to the *Beijing Review*. The first involves 65 large and medium-sized water conservancy works to aid agricultural development.

The second entails construction of the Gezhouba Hydropower Station in Hubei Province and the Longyangxiz Hydropower Station in Quinghai Province. Each would have a generating capacity of over 1 million kilowatts to foster heavy industry development.

Expertise Sought

The Water and Power Resources Service, along with the Department of Energy, the Army Corps of Engineers, and the Tennessee Valley Authority, will offer technical advice and expertise for China's projects.

Exchanges between U.S. and Chinese engineers have already begun. In May 1979, a Chinese Power Delegation headed by Vice-Premier Chang visited the United States. The group consisting of hydroelectric power, coal, and oil subgroups toured six States and Washington, D.C.

The hydropower subgroup inspected many hydroelectric power facilities and offices. Mr. Li Rui, Vice-Minister of Power; Mr. Lu Quinkan, Senior Engineer; and Mr. Yuan Huanxin of the Peoples Republic of China Embassy, visited the sites that could provide them with information on designs and operating experiences for similar types of projects that are being considered for construction in China.

John E. Skuderna, a Water and Power engineer, served as an escort to the delegation. He reports that Vice-Minister Li expressed a strong interest in establishing working relationships on hydroelectric power development in the United States.

Li said the Jinbing Project on the Upper Yangtze River in Szechwan Province, and the Lungtai Project on the Hungshui River in Kiangsi Province are two projects with high priority for early development. The Jinbing Project would have the potential of 6,000 megawatts, and the Lungtai Project would have the potential of 3,000 megawatts.

Skuderna said he believes the Chinese engineers will place a high priority on their biggest hydroelectric projects only after the above projects are well underway.

In a few years, the Chinese may be economically prepared to undertake some of their truly enormous hydroelectric projects, such as the Yangtze River Gorge Project in Hupeh Province, close to the Szechwan Province border.

This dam would be the largest on earth, with an energy potential of 30,000 megawatts...five times the size of the Grand Coulee complex. Water and Power personnel helped in preparing preliminary plans for these projects in the 1940's.

U.S. engineers already have visited some of China's projects to gain an understanding of the "state-of-the-art" technology China has developed in hydroelectric power development and water management.

Donald A. Giampaoli, Water and Power's director of dam safety, visited the Peoples Republic of China in September 1979. His account of his visit appeared in the last issue of *Reclamation Era*, (Vol. 65 No. 2).

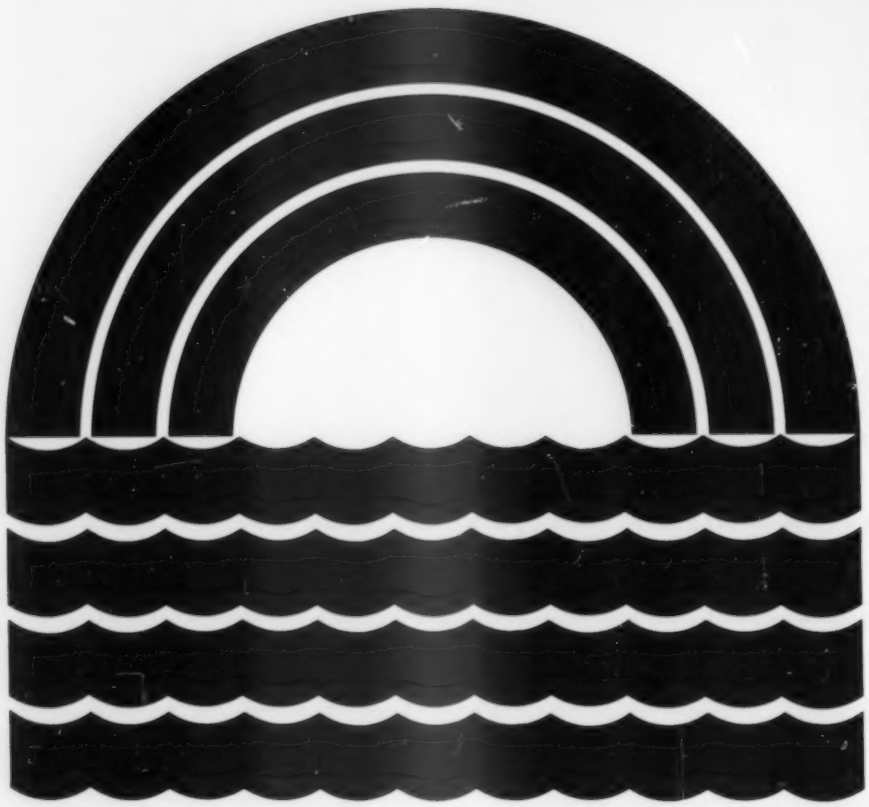
Last November, eight Chinese engineers visited Water and Power facilities to learn how to use computers to manage the generation of power from its huge hydroelectric plants. The Hydroelectric Power Station Automation Study Group was headed by Shen Xinxiang, Vice Chairman of the Science and Technology Commission under China's Ministry of Electric Power. In addition to visiting the Pacific Northwest and California, the study group toured the Grand Coulee facilities and Water and Power's Engineering and Research Center in Denver. The Study Group at Grand Coulee observed the use of microprocessors in the automation of hydroelectric power stations.

Commissioner of Water and Power Resources Service R. Keith Higginson toured China in March 1980, visiting some of China's potential hydroelectric projects. Others in the group included Assistant Secretary Guy Margin and several engineering specialists in the fields of geology and rock mechanics.

(l. to r.) Joe Chriqui, Resident Engineer at Rock Island Dam and Powerplant, explains workings to Ernest Staber, National Council of U.S.-China Trade; Mr. Lu, Senior Engineer, China's Ministry of Electric Power Industry; Vice Minister of Electric Power Industry Li; Sterling Munro, Bonneville Power Administration.

Watching A Rainbow

by Kim R. Bell



Imagine boating on Lake Powell, one of the most spectacular man-made wonders of the West...exploring upstream from Arizona into Utah, where a magnificent natural wonder awaits...Rainbow Bridge.

Navajo Indian legend says Rainbow Bridge, "Nonnezoshi," is a rainbow turned to stone. Actually, it is a sandstone arch formed millions of years ago by erratic stream erosion. It was officially discovered in 1909 and, within a year, was established as the 160-acre Rainbow Bridge National Monument.

The controversy today stems from the water Lake Powell backed up beneath the bridge. Some environmental groups speculated that the stone bridge would "crumble" with water softening its foundations. The Water and Power Resources Service believes that this will not happen.

The truth? Studies indicate, so far, that Lake Powell waters are not damaging this largest known natural stone arch.

Kim R. Bell was a Student Writer-Editor from Colorado State University, working in the Public Affairs Service Center, Denver, Colo.

Photography by Vern Jetley, Upper Colorado Region.

The controversy concerning Rainbow Bridge began with passage of the Colorado River Storage Project Act of 1956. This law provided for construction of Glen Canyon Dam in Arizona as one of four storage units to control the Colorado River and its tributaries. Glen Canyon's reservoir, Lake Powell, would provide water for the Lower Colorado River Basin. In addition it would help fulfill agreements with Mexico on irrigation and municipal use of the Colorado River water.

As to protection for the stone arch, the act stated, "...that as part of the Glen Canyon unit the Secretary of the Interior shall take adequate protective measures to preclude impairment of the Rainbow Bridge National Monument."

However, in 1961, a Senate and House Works Appropriation bill was passed stating, "no part of funds herein appropriated shall be available for construction or operation of facilities to prevent waters of Lake Powell from entering any national monument."

Since the bill's passage and Glen Canyon Dam's completion in 1963, the reservoir had been steadily rising. By May 1971, the lake reached 3,606 feet elevation. This elevation extended Lake Powell to the western boundary of Rainbow Bridge National Monument. As the water entered the monument, environmental groups filed a complaint. They insisted that the Federal Government should stop the water from backing into the monument.

The suit stated, in part: "Damage to Rainbow Bridge from fluctuating standing water beneath it will occur... Constant wetting and drying of the foundation sandstone supporting Rainbow Bridge may in time weaken the structure of the bridge to a point where it may crumble."

As a result of the suit, the 10th Circuit Court decreed that the Bureau of Reclamation (now the Water and Power Resources Service) begin a monitoring program to determine what, if any, harmful effects Lake Powell would inflict on Rainbow Bridge. The program began in 1974 and will last for 10 years. Water and Power receives assistance in certain aspects of the program from the National Park Service and the U.S. Geological Survey.

Conditions of the rock before and during the presence of water under the bridge are being tested by Water and Power through rock samples, a seismograph, aerial and surface photography, a meteorological station, and elevation surveys.

Aerial view of Rainbow Bridge, looking downstream.

Survey crew at work, man in background is on top of the bridge.

Tests on the sandstone rock include measuring changes in the width of structural fractures. Measurements are taken using Whittemore Strain Gauges. There are three gauge stations under the bridge: two on the west leg and one of the east leg. The changes observed in the fracture widths measure approximately the thickness of a piece of typing paper. So far, these changes in crack width relate to seasonal temperatures, not from water damage. Measuring the cracks in the coldest part of the winter and the hottest part of the summer reveal the maximum change in width. But, the measurements will also record either sudden or long-term changes in fractures. These changes may be attributed to earthquakes, heat, water, gravity, or other forces.

To determine the effect of water on Rainbow Bridge, several rock samples were taken from the arch and analyzed in the Engineering and Research Center laboratories in Denver for moisture content and strength. Observations also revealed that the foundation has been under the influence of groundwater and the flow of Bridge Creek for eons with no apparent weakening. For example, a sample of sandstone taken from the creek bed beneath the bridge cannot be cut with a power diamond saw.

With assistance from U.S. Geological Survey, Water and Power established a seismograph and microwave repeater station about 1 mile west of Rainbow Bridge. The seismograph is sensitive to ground motion and records all earth tremors or shocks that occur in a 50-mile vicinity regardless of the source. Rockfalls from the canyon walls near the bridge are also identified by the seismograph. The information is transmitted via the microwave repeater to the U.S. Geological Survey Earthquake Center in Golden, Colo. Since the beginning of the monitoring program, no earthquakes or natural ground motion have been recorded in the area surrounding Rainbow Bridge.

The critical structural features of the arch and surrounding area are analyzed using photography. Photographs taken biannually are compared with original photographs taken when the monitoring program began. Specific points and close-up views are emphasized. The pictures are taken at the same angle and time of day to ensure an accurate comparison of changes in the sandstone.

One change in the pink sandstone identified by photography is increased erosion. Water and Power scientists have observed evidence of erosion on top of Rainbow Bridge and surrounding cliffs caused by wear and tear of visitors to the monument. According to statistics released by the National Park Service, over 95,000 people visited Rainbow Bridge National Monument in 1978.

A meteorological station is also a part of the study program. This station is collecting data and recording statistics on barometric pressure, humidity, wind direction, and speed and temperature of wind and air. Present meteorological data indicates nothing other than normal weather conditions occur in Bridge Canyon or on Rainbow Bridge as Lake Powell waters back up.

The Water and Power Resources Service had calculated that the surface of Lake Powell would reach 3,700-foot elevation only 13 percent of the time during the initial 50 years of operation. But, water would be under Rainbow Bridge 77 percent of the time, and within the monument 95 percent of the time. When Lake Powell reaches its maximum elevation of 3,700 feet, the water will still be 21 feet below one abutment and 33 feet below the other abutment. As of June 1979, Lake Powell had reached 3,672 feet, the highest elevation yet.

Water and Power Resources Service has taken every precaution to test the bridge without damaging or defacing the sandstone or the surrounding environment. In accomplishing this, the instruments being used for the monitoring program are camouflaged, keeping the area as natural as possible for monument visitors.

Geologist Chuck Rorvik taking Whittemore gage readings.

Tourists disembark on landing in Bridge Canyon, on their way to view Rainbow Bridge.

Rainbow Bridge, note monitoring crew on top.

The Newlands Project... A Look At The Past

by Morgan Malone

After years of political struggle, advocates of federally-supported water projects in the Western States and Territories succeeded with the passage of the National Reclamation Act of 1902. The work was to be administered by the U.S. Geological Survey's Reclamation Service (today's Water and Power Resources Service).

Possible Nevada reclamation projects had been under survey since 1889, but the most promising from an engineering standpoint was to combine the Truckee and Carson River flows to irrigate approximately 400,000 acres of Lyon and Churchill Counties, near Fallon, Nev.

In spite of mining wealth prosperity from 1859, depression set into Nevada from approximately 1880 to 1900. In the U.S. House of Representatives it was seriously suggested that the State return to territorial status or become another county of California. Promotion of irrigated family farms and storage of water along major rivers became a solution to the Nevada crisis. Few individuals saw Nevada as an agricultural state, but the most influential of these was Francis G. Newlands.

Morgan Malone is a Public Information Specialist in the Public Affairs Service Center, Denver, Colo.

Photography by B. D. Glaha.

Fernley, Nev. (Newlands Project, 1943).

Newlands was a Yale law graduate and the son-in-law of William Sharon, former senator from Nevada. In 1888 after an unsuccessful attempt to win a seat in the U.S. Senate, Newlands decided to move from California to Carson City, Nev. The next year he purchased tracts of lands along the Truckee River in Reno, Carson Valley, and on the lower Truckee River, including the site of Lake Lahontan.

In addition to purchasing tracts of land, Newlands conducted significant surveys of irrigable lands in western Nevada, retaining surveyors and consulting engineers. Plans were developed for water storage and canal systems in various localities, mapping favorable sites for water storage and irrigation. Particular attention was paid to the Lahontan Valley, including suggestions that the Carson be dammed in the vicinity of today's Lahontan Reservoir, and the sites of Derby Dam and Truckee Canal.

Feasibility reports to Newlands recommended that the lower Carson River could support a reclamation project of over 100,000 acres. Newlands actively tried to enlist support from local residents and developers throughout the 1890's. Between 1892 and 1902, Newlands even toured the area with interested eastern bankers and land agents. Nothing was done until the passage of the national Reclamation Act of 1902.

Francis G. Newlands

Two Reclamation employees stand in portal of diversion tunnel (undated).

Newlands Project (undated).

A special train carried Cong. Newlands and 40 dignitaries to dedicate and open the "Big Ditch" (Derby Diversion Dam and Truckee Canal—1905).

Fishermen on the Newlands Project (undated).

Recognizing the impact reclamation could make on Nevada, Newlands decided to ride the issue into public office. He served as U.S. congressman from Nevada from 1892 to 1902, and as U.S. Senator from 1903 to 1917.

During the presidential year of 1901, each of the major party platforms carried planks supporting federal reclamation. Newlands joined the Progressive Movement. He was unsuccessful in attempts to pass a reclamation bill until a suggestion by a colleague that they draft a bill creating a federal reclamation system supported solely from the sale of public lands in the West—not from the general revenues.

In December 1902, forty western congressmen met with Newlands to draft a compromise reclamation bill. By January 7, 1902, the final draft passage became almost machine-like, under pressure from President Theodore Roosevelt and the reclamation bloc. A final compromise had to be made in April 1902 because of George H. Maxwell, a California attorney turned reclamation lobbyist. Maxwell insisted upon doubling the acreage limitation to 160 acres, banning the sale of excess water to private interests, and the granting of permission for homesteaders to live outside the reclamation project area.

With the changes incorporated, a pleased President Teddy Roosevelt signed the Reclamation Act into law on June 17, 1902.

Construction of the Carson Sink laterals. (undated).

Lahontan Dam spillways (1942).

Almost a year went by after enactment of the reclamation program before the first sites were publicly announced. On March 14, 1903, the Secretary of the Interior selected five initial sites for reclamation projects in the 17 Western States, including Nevada's Truckee-Carson Irrigation Project.

As originally designed, the project affected all of western Nevada and included over 400,000 acres of irrigated fields. It stretched from Lake Tahoe through the Truckee and Carson river basins, with canals reaching Lovelock and the sink of the Humboldt River. After 20 years of depression, Nevada entered a new and prosperous future. Over 100,000 inhabitants were expected within the Truckee-Carson area by 1920, compared to only a few hundred residents living there at the turn of the century.

On June 17, 1905, a congressional delegation headed by Senator Newlands formally opened the Derby Dam-Truckee Canal system. For the first time, water flowed onto a federally-managed reclamation project. The face of Nevada changed for the better over the years that followed.

Weber Lake Dam (1927).

The Truckee-Carson Irrigation Project was renamed on February 27, 1919, in honor ot the then late Senator Francis G. Newlands for his efforts in the passing of the national Reclamation Act and for reclaiming the lower Carson Valley lands from recurring floods and drought. The Omnibus Adjustment Act of May 25, 1926, contained a provision to reduce the original scope of the Newlands Project and to adjust the repayment amounts.

Today the project stretches across Churchill, Lyon, Storey, and Washoe Counties, irrigating an area of 73,002 acres. The major facilities include: Lahontan Dam, Reservoir, and Powerplant; Carson River Diversion Dam; Lake Tahoe Dam, Boca Dam and Reservoir; and Derby Diversion Dam. From 1905 to 1978, the Newlands Project produced crops with a gross crop value of $214,333,855.

Early Days of Western Reclamation

by Carlos S. Whiting

Recent discussions of national water policy, western irrigation, and dam building are generally inadequate in that they breeze too lightly over the history and evolution of these major issues. Most notable is the lack of knowledge and understanding of the local origins of Federal reclamation. Most of these Water and Power projects reflect decades of strong local initiative.

Surprisingly, many people today who are critics of Water and Power and preach the virtues of self help—including local initiative and autonomy, regionalism and decentralization of authority—would have liked the early days of irrigation and Federal reclamation in the West.

E. F. Schumacher—in his stimulating book, *Small is Beautiful*—has been the principal "high priest" of local autonomy and decentralization. His challenge is to the centralization of planning and authority, uncontrolled urbanization, and modern concepts of big business and industry. Bigness itself is the enemy, taking events and solutions out of the comprehension and control of individuals and communities.

Carlos S. Whiting is a Public Information Specialist, Washington, D.C.

Photography by Gene Hertzog, Lower Colorado Region; Walter J. Lubken.

Dam construction on Shoshone Project, Wyo.- 1909.

The Cole family home, during construction of Shoshone Dam (now Buffalo Bill Dam), Wyo.

Theodore Roosevelt Dam, Arizona.

He advocated ways to bring the work, problems, and aspirations of people down to a manageable and realizable level. On a small scale, in the environs of their own homes and in their own communities, people working together can resolve most of their needs and concerns. To be workable, said Schumacher, everything must be on an observable and understandable "human scale."

Much of what the devotees of decentralization talk about may be seen in the early days and evolution of reclamation in the West. Through the early 1900's and initially in the New Deal era, the programs of the Water and Power Resources Service embodied the ideology and ideal of localism. The scope of Water and Power and many of its programs, changed over the years. It reflects an almost classic struggle between giantism and localism.

The idea for a Federal reclamation program evolved in the late 1800's (and it was authorized in 1902) as a national instrument to help people settle the West and to strengthen the economy and security of the Nation.

Planning engineers, Shoshone Project, Wyoming - 1904.

Settlers in the semiarid and frequently hostile climate of the American West applied the ideas and virtues of localism and cooperative self-help to develop and conserve vital water supplies. They worked together to build diversion dams, canals, and irrigation laterals to serve their own farms. Thus, Water and Power had authentic roots in the practices and policies of these early settlers.

The roots also include age-old concepts of water conservation and irrigation as practiced by the Pueblo Indians, especially the Zuni. The latter are known particularly for their organized mutual efforts in establishing stable farming communities based on the judicious use of water.

Spanish priests, with their own traditions of irrigation and water management from Spain and Mexico, built missions among the receptive Indians. Around these Catholic missions ultimately settled farmers and tradesmen from the American East, creating such cities as Santa Fe and Los Angeles.

Also well known are the numerous Mormon colonies, not only in Utah but widely dispersed in the late 1800's throughout the West from Mexico to Canada. Mormons were the first settlers in the Intermountain West to found their communities on irrigation. Their small communities of autonomous farmsteads were tied by strong bonds of mutuality and cooperation.

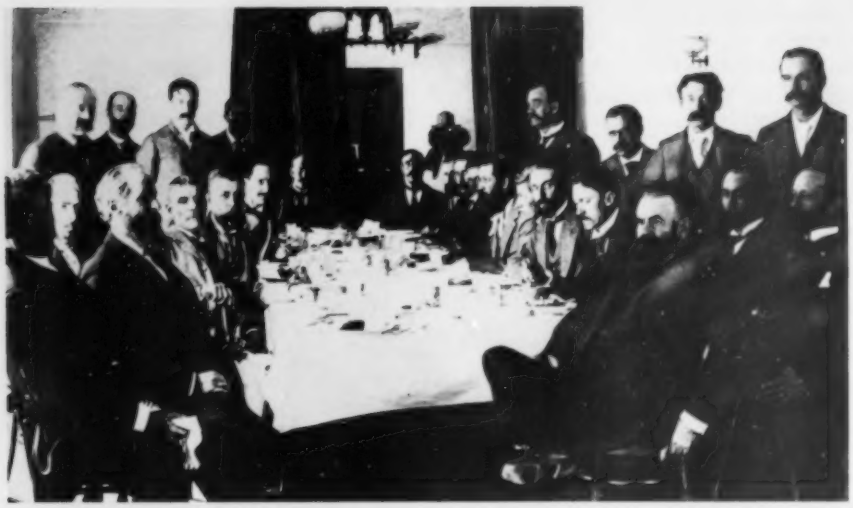
The California gold rush of 1849 gave an additional modest push to irrigation and to the growth of farm communities, because miners had to eat. In addition, some gold panners were unsuccessful in their search for the yellow metal and easily resorted to farming as a better-known trade. The sporadic availability of water, however, led many of these farmers to turn old sluices and other abandoned mining waterworks to irrigation. This usually required several farmers working together under their own simple rules to develop the irrigation supply.

When it came, the Reclamation Act of 1902 saw a significant break with earlier and inadequate Federal land settlement practices which emphasized individual homesteading and settlement. Farmers on their own were often overwhelmed by climatic swings and droughts.

Water and Power, while initially contracting with individual water users (to meet the repayment requirements unique to these public works) and retaining operation and maintenance responsibilities, later began to create a matrix for cooperative settlement by organizing water districts. Construction of Federal Water and Power projects strongly impelled settlers to work with one another to achieve common social and economic objectives.

Ditch-digging in preparation for spring irrigation, Belle Fourche Project, S. Dak. (1909).

Cody, Wyo. - 1904.



Major John Wesley Powell, right center, at staff luncheon.

Similar but smaller cooperative settlements were undertaken by other groups. These included the Greeley Colony in Colorado and the Anaheim Colony in California. In addition, there continued a small flood of individual settlers.

The next stage of irrigation development occurred as speculative, for-profit ventures of water companies. These companies, generally, operated very much like the cooperative water district. However, since the companies' need for profits added heavily to farmer costs, and because the West was afflicted with droughts and depression in the 1890's, these ventures fell on hard times and frequently failed.

The popular explorer and visionary, Major John Wesley Powell, began a public campaign for the Federal Government to accept engineering and fiscal responsibilities for western water development. Simple diversions from nearby streams were inadequate, he said, especially in time of drought. What was needed were large dams and reservoirs to store up winter and spring runoff. As this was beyond the resources of local groups, large dams and canals called for Federal assistance in surveys, engineering, construction, and long-range financing. Powell anticipated, however, that control would remain with local and State authorities.

"The West is an arid land hostile to farming and will never be settled even with irrigation unless the Government dams the rivers to save up winter and spring runoff in artificial lakes."

—John Wesley Powell
1879

The Reclamation Act called for repayment of project costs by the local beneficiaries. In 1914, Congress authorized the Secretary of the Interior to designate water-user organizations to act as fiscal agents in making these long-term contracts and in collection of annual payments by the water users.

To facilitate this process further, Water and Power successfully encouraged States to give irrigation districts taxing authority. This authority helped initiate and finance community water systems. Small towns began to grow into small cities.

Early irrigation in the West.

Freight wagon on its way to Salt River Project, Ariz.(1906).

In 1922, the Secretary was authorized to contract directly with irrigation districts for project obligations. This streamlined the program by dispensing with water-right applications by individuals. Multiple-purpose planning and development became a central element of local water-user organizations. Additional legislation in the 1920's and 1930's placed project financing on a sound footing, put more operation and maintenance responsibility on local water users, and overcame some of the shortcomings of the original act.

The democratic structure of water districts assured impartial allocation of irrigation and domestic water and the preservation of majority and minority rights.

On early projects, Water and Power carefully nurtured the creation of local social, business, and financial organizations (ranging from recreational groups to marketing associations). These educational efforts were often initiated by project managers (aided by bulletins from Washington and the establishment of project newspapers). Project managers became integral members of their communities and accepted school and local government responsibilities. The wives of project managers and engineers took the lead in women's organizations that not only helped bring "civilization" and culture to the semiarid wilderness but made them centers of local political activism.

In all this, Water and Power as a Federal agency under its early Commissioners tried to avoid a paternalistic role in local affairs. Projects stemmed from local assessment of needs and the creation of action groups to seek Federal assistance. Steering committees, organized democratically from local water districts, worked informally with Water and Power engineers in planning projects and providing a sound footing for local people to seek congressional authorization.

This process, interestingly, foreshadowed provisions of the 1969 National Environmental Protection Act (NEPA) which affected public works nationwide. NEPA requires public review and comments on potential public works and other projects.

Early Water and Power development has further ties to modern concepts of "ecodevelopment" advanced by Maurice Strong, Ignacy Sachs, and others in the United Nations Environment Program (UNEP). The UNEP says (among other things) that "the form and rate of development should be determined by the people most affected by it" ..."in terms of local value systems"...using "the knowledge, techniques, and technologies of the local people."

The programs and emphasis of the Water and Power Resources Service continued to evolve and to change, especially during the "big dam" period of the 1930's and 40's. Low-cost electric power, a byproduct of water development, had a profound effect in accelerating urban and industrial growth. This was a period of little emphasis on local initiative.

Water and Power also began a long-range change as a result of demands on project water to meet city domestic and industrial needs. As with the availability of electric energy and its effect on urbanization, this both reflected and accelerated the loss of local project autonomy.

It was during the 1940's that the successful experiment with the Tennessee Valley Authority led to efforts to replicate TVA in a Columbia Valley Authority and Missouri Valley Authority. While river basin development and regional integration did ultimately derive from this effort, powerful economic and political forces were marshalled to head off what seemed to some people as a drive toward "socialism."

World War II fostered industrial concentration, and post-war growth was spurred by pent-up demand and billions of dollars in fast tax write-offs. With the growth of worldwide corporate interties and international banking, American economic forces seemed far removed from local interests.

Population pressures and new settlers from the East combined with these new giant economic interests to change western attitudes in other significant ways, but many of the established patterns and concepts of local initiative, autonomy, and decentralization remain strong throughout the West. It is no coincidence that much of the current emphasis for return to localism originates where it was strong a hundred years ago.

Water Quiz

1. One of the most far-flung and intricate canal systems of antiquity was developed by the _____.
   a. Russians
   b. Japanese
   c. Chinese

2. Meats are _____ percent water.
   a. 10-30
   b. 30-50
   c. 50-70
   d. 70-90

3. All but about _____ percent of the Earth's water is found in oceans.
   a. 3
   b. 5
   c. 7

4. Dams are designed to:
   a. back up reservoirs for irrigation.
   b. store municipal and industrial water.
   c. produce hydroelectric power.
   d. improve navigation.
   e. protect against floods.
   f. all of the above.

5. The gland which protects the eyeballs by coating them with a watery film is called _____.
   a. sweat
   b. lacrimal
   c. thyroid

Answers to Water Quiz on page 28.

Most Requested Photographs From the Lower Colorado Region

by Gene Hertzog

The Lower Colorado Region of the Water and Power Resources Service covers an area which includes Arizona, western New Mexico, southern Nevada, southeastern Utah, and southern California. This region is mostly desert, and the photographs capture the flavor of the area.

These photos have been the most requested by other publications to give an overall view of this southwest area of the country.

Gene Hertzog has been the regional photographer in the Lower Colorado Region for more than 16 years.

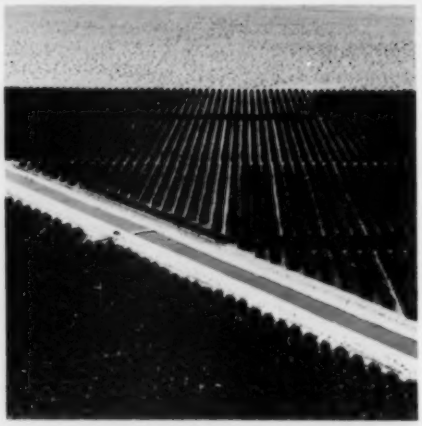
Rows of lettuce being irrigated near Blythe, Calif.

The largest precast-prestressed concrete pipe ever produced are being installed by Water and Power on the Central Arizona Project.

A Water and Power geothermal well 7 miles east of Holtville, Calif.

Horseshoe Dam near Globe, Ariz.

Hoover Dam

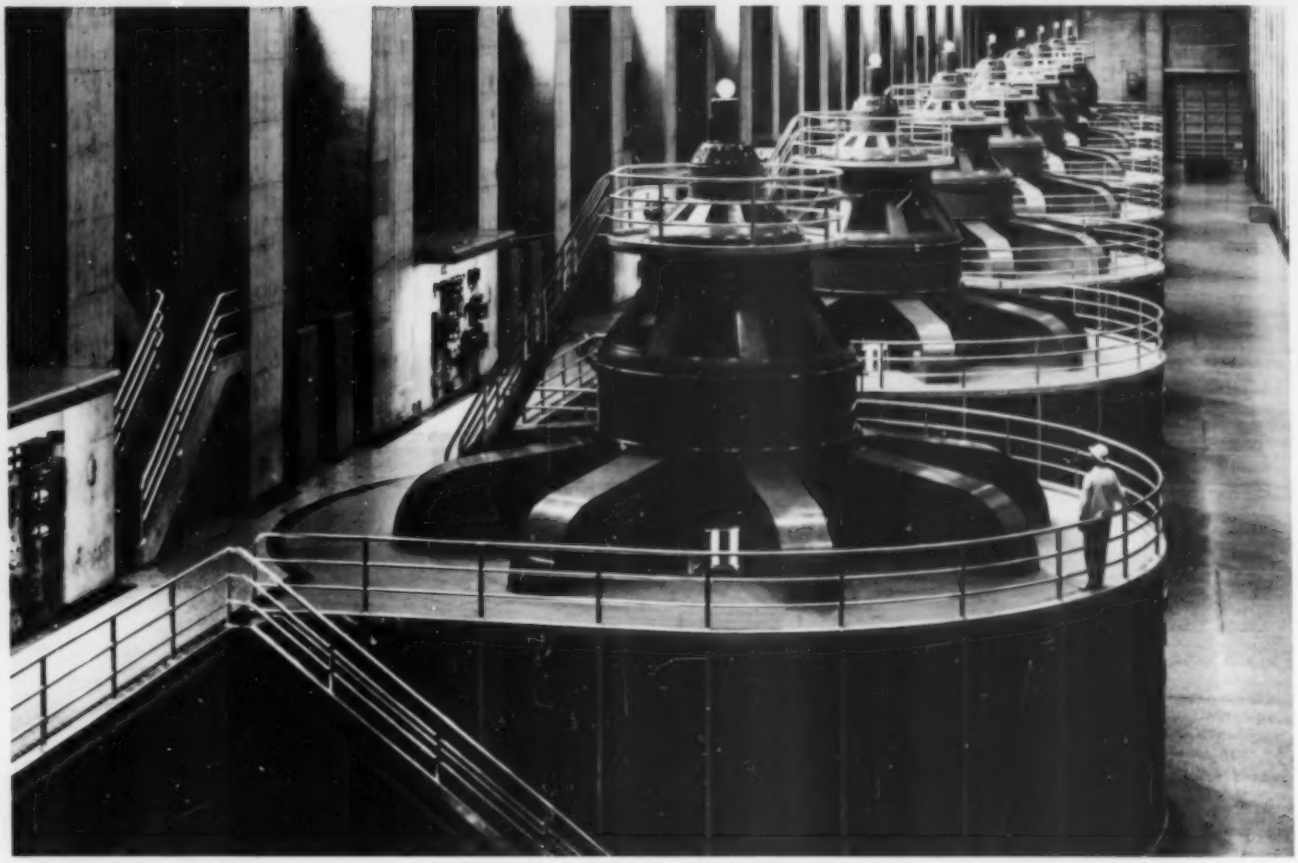


Sharp contrast of citrus trees and desert near Yuma, Ariz.

A beach on Hoover Dam's Lake Mead.

Colorado River near Parker, Ariz.

Theodore Roosevelt Dam, 30 miles northeast of Globe, Ariz.

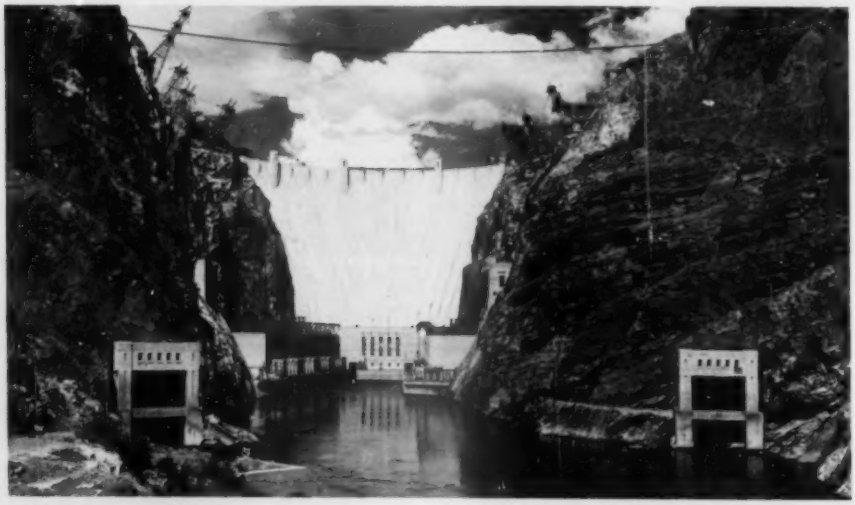


Generators in Hoover Dam's powerplant.

Pinnacle Peak transmission lines crossing Arizona desert.

A Joshua tree in the Nevada desert, while windmill pumps water for cattle.

Project Skywater aircraft returning from a seeding mission.



Hoover Dam, showing the outlets downstream.

Answers to Water Quiz

1. b., Chinese.
2. c., 50 to 70.
3. a., 3.
4. f., all of the above.
5. b., lacrimal.

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